



## Fermilab's Ergonomic Success Stories

Author: Ergonomics Subcommittee

Editor: Tim Miller

Designing workstations to fit the body mechanics of people is what ergonomics is all about. Poorly designed workstations can cause cumulative trauma disorders (CTD) otherwise known as repetitive motion injuries. CTDs are defined as injuries caused by wear and tear on tendons, muscles, and/or nerve tissues. A useful definition of CTD can be constructed from each word. **Cumulative** indicates that the injury develops gradually over periods of weeks, months, or even years; **trauma** signifies that the bodily injury is from mechanical stresses, and **disorder** refers to a physical ailment. Carpal tunnel syndrome and tennis elbow are some examples, however, there are many others. Symptoms of CTD include pain, restricted joint movement, swelling, decreased sense of touch, and/or reduced manual dexterity. CTD's have a slow onset, therefore symptoms are usually ignored until they become chronic and sometimes permanent.

Most CTD's develop when body movements become forceful, repetitive, and awkward. **Force** causes increased muscle effort and a decrease in muscle circulation resulting in rapid muscle fatigue. In addition, large mechanical stresses are placed on the tendons, muscles and nerves. **Repetitive** tasks require rapid and frequent muscle contractions. Repetitive tasks require rapid and frequent muscle contractions. Muscles required to contract at a high velocity are unable to contract to their full potential and require more muscle effort and more time for recovery. Awkward **postures** can pose significant biomechanical stresses to the joints and surrounding soft tissues. For example using a bent wrist will increase the exertion and tendon tension required to do a job. That is why an unbent wrist will greatly reduce the likelihood of injury.

Ergonomic job design attempts to reduce or eliminate these risk factors. The following are examples of design changes that have been implemented at the Lab:



MP-9 and Lab 8 installed *Ergolifts* to lift and move CMS panels. This eliminated the need for awkward manual lifting. The *Ergolift* uses suction to lift the panels. The operator can then easily move the panel to where he needs it, without having to twist his back.



The TD Weld Shop purchased *EZsafe* cylinder carts that enable welders to easily move compressed gas cylinders on and off a weld cart without awkward manual lifting.

Lab 8 has small chairs with castors to allow operators to



work on the router without having to bend their backs.

What's wrong with this work area? The monitor is too high, the chair is not adjustable or supportive of the lower back, the work surface is too high, the wrists are resting on the hard edge of the desk, mouse placement requires reaching, and outside light is creating glare on the monitor screen.



Many work areas, like this one in the FCC, have been redesigned or retrofitted to eliminate or ameliorate these problems.

Even with an ergonomically enlightened design, there is a risk of injury if muscles are not conditioned for the task or there are no breaks in the work routine. Computer users,

for example, should take a brief break at least every 30 minutes. Simple stretching exercises can improve muscle conditioning and reduce fatigue.

The PPD Alignment and Metrology crew began a morning stretching program in January. The stretching regimen was provided by a physical therapist that reviewed the crew's daily tasks and the physical conditioning of each crew member.



A similar program was conducted in CDF for employees doing overhead cabling work.



**To learn more about ergonomics**, contact your representative on the Fermilab Ergonomics Subcommittee:

CD	Amy Pavnica	FESS	Greg Mitchell and Lisa Carrigan
PPD	Maureen Huey	ES&H	Mae Strobel
BD	Mike Bonkalski	TD	Rich Ruthe
LS	Jack Hawkins		

The following are upcoming committee activities. Contact your committee representative for further details.

- Computer ergonomics training
- Industrial ergonomics training

*This message should be distributed to all employees via delivery of un-addressed copies to Fermilab mail stations.*  
Suggestions for ES&H message topics should be directed to Tim Miller at MS119, [tmiller@fnal.gov](mailto:tmiller@fnal.gov), or X3019.